



FACULTY OF TECHNOLOGY

The Role of a Single Project in Business Model Innovation of a Project-based Organization

Zishi Wu

Product Management

Master's thesis

June 2019



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ABSTRACT FOR THESIS

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<p>Abstract</p> <p>Purpose: Business model innovation is a rising trend as companies look for a competitive advantage to create and capture value for their stakeholders. Project is the primary unit on the value delivery of products or service. Understanding how a single project impacts the business model innovation may benefit company.</p> <p>Design/methodology/approach: The research is built on the literature of project selection, project business, business model, and business models innovation. The thesis applies a qualitative approach, utilizing the case study method and in-depth interviews as research methods. The empirical part is carried out based on two separate research projects in a project-based organization-the Industrial Engineering and Management (IEM) unit at the University of Oulu.</p> <p>Findings: The IEM unit has two types of offerings: degree program and research service. We summarize their business logics of operating these two offerings by elaborating nine business elements-value proposition, offerings, cost structure, revenue model, channel, key resources, key activities, value network, and customer. This thesis concludes that reconfiguration of value proposition and introduction of new value proposition and new activities drive the IEM unit to reconfigure its business model. In addition, a research project will reinforce and complement its core business-degree program by enriching teaching material.</p> <p>Research Limitations: The number of case projects in this study is limited to two. Since the selected cases are on-going projects, this study shows potential impacts of the cases on reconfiguring the existing business model. In addition, project data collection was blocked off due to a non-disclosure agreement.</p>			
<p>Key words</p> <p>Business model, Project selection, Business model innovation, Project-based organization</p>			
<p>Additional Information</p>			

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I started doing this master thesis in March 2018. At that time, I felt lost because I did not have any specific topic in mind to work on. Prof. Jaakko Kujala and Dr. Farzad Pargar who are knowledgeable and well-experienced in the research area of project management, helped me to tease the topic out according to my interest in project management. After that, they also helped me to look for the case company and research case projects. I am grateful for their help at the beginning phase of my master thesis.

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1 INTRODUCTION

1.1 Motivation of the study

Investing in innovation is a critical piece of global competitiveness and it comes in many forms – from traditional R&D to new products, markets and business models (GE "global innovation barometer", 2012). (IBM Global CEO Study, 2008; GE Global Innovation Barometer, 2013) have found that competitive pressures have pushed business model innovation to the top of CEOs' priorities, not least because a firm's choice of which business model to adopt has been shown to be an important determinant of its performance.

Business model concept is a tool to address the business of a project-based firm, which is a statement of how the company makes money (David W. S. and Qin Z, 2000) or how technological inputs are transformed into economic output (Henry W.C., 2003). Baden et al., (2013) reported the relationship between business model renewal and technological innovation and also exemplified that production system change also brought about business model innovation.

These days companies are competing in a fast-changing and highly global environment. Project selection is one of the most important decisions that an enterprise may deal with. They cannot select all projects interesting to them (Hedman J. and Kalling T., 2003). Understanding the role of projects in achieving an organization's strategic goals significantly increased in recent years. David et al., (2005) reported that projects can work as strategic arena to develop new capabilities. The increasing complexity of projects makes it difficult for any single firm to own all capabilities and resource (Kujala J. et.al 2008).

In this research, we will consider a single project as an entity to find out how it affects the business model innovation of a project-based organization.

1.2 Background of the study

Project-based nature is very common in various industries, like for example the construction industry (Barrett and Sexton, 2006), the information technology industry (Hodgson, 2002). Artto et al. (1998) described that a project-based organization is an organization that delivers products, service, and solution to its customers through project. Such an organization is entirely dedicated to one or more projects. A project is an endeavour in which human, financial and material resources are organized in a novel way to undertake a unique scope of work, of given specification, within constraints of cost and time, to achieve beneficial change defined by quantitative and qualitative objectives (Turner J.R., 1993). PMI defined a project as a temporary endeavour undertaken to create a unique product, service and result (Project Management Institute, 2013).

Business models have already been researched by multiple scholars. We can describe a business model as how a company makes money, how an organization's works have been accepted (Teece D.J., 2010; Baden F.C. and Haeffliger S., 2013). Every organization has one business model or more, which differentiates the company from others. The business model is seen as the conceptual and architectural implementation of a business strategy and as the foundation for the implementation of business processes (Osterwalder A. And Pigneur Y., 2002). Many factors might influence the choice of business model at the organizational level including customer behaviour, technology, market opportunity and competition (Joan M., 2002; Chesbrough H.W., 2007). Kujala et al., (2011) found that there were seven factors influencing the choice of business model classifying into (1) the existence of the customer's maintenance organization; (2) the skill-level of the customer's maintenance organization; (3) the level of complexity of the delivered technology as perceived by the customer; (4) the supplier's marketing approach to the solution; (5) the customer's core business; (6) the customer's financial resources, and (7) the project supplier's or customer's accustomed business practices and organizational structure. Nicolaj et al (2001) , Tikkanen et al.,(2005) and Chesbrough et al.,(2002) recognized that factors, e.g. institutionalized industry practices, the firm's past success, and established methods of business, affect the choice of business model.

In the global marketing environment, a company should seek new forms of competitive advantage or business opportunities. Innovation is an inevitable outcome of continuously sustainable development for companies, which increases their advantage, positively impacts economic performance (Nybakk E., Crespell P., Hansen E., and Lunnan A., 2009) and improves organization performance (Eric N.H., 2010; Välimäki H., Niskanen A., Tervonen K., and Laurila L., 2004; Weiss G., Pettenella D., Ollonqvist P., and Slee B., 2011). Innovation in a sector can be separated into three categories: product, process, and business systems (Eric H., Erlend N., and Rajat P., 2014). Business model innovation is the strategic way to separate competition from others (Hamel G., 2002).

Most studies were initially focused on product or process innovation, with business model innovation for sustainability being a rather new area of interest (Geissdoerfer M.B., Savaget P., and Evans S., 2017). Baden et al., (2013b) mentioned technology development can facilitate new business model. Business model innovation is a common phenomenon in business from an international perspective (Cao L., Navare J., and Jin Z., 2017). Kujala et.al (2008) reported that project related factors, e.g. novelty, complexity, and total cost in the project lifecycle, were the drivers for selecting a specific business model.

1.3 Research problem and objective

In a project-based organization, competence can be built up through the execution of projects (Sabrina, L.F., 2016). A project-based organization uses projects to deliver service to their client. A project within a project-based organization is defined as a primary business mechanism for coordinating integrating all the main business functions of the firm (Mike.H., 2000). Project selection is a strategic decision process which dominates the companies' performance (Pekuri A., and Pekuri L., and Haapasalo H., 2013).

One company could have more than one business model in use simultaneously due to serving several customer segments. What business model a company uses is totally relying on the characteristics of a project. Artto et al., (2008) reported that service as extension of product, which can be produced before, during and after the implementation

of a project, can positively impact the business performance in a different logic, e.g. customer value, competition advantage, customer entry. Mohanbir et al., (2004) suggested creating a new business model for service which focused on business topics and the overall functionality.

For this research, the key question is to find out the answer of “how a single project impacts business model innovation in the case organization”. In order to answer this question, we also choose to focus on project selection and project selection criteria for understanding the single project’s context and on the existing business logic of the case organization to explore how the case organization creates and captures value and defines value proposition for its customer and partner. The sub-questions, also called supportive questions, are listed below.

1. What is the business logic of the organization?
2. What elements were included in the case company’s existing business logic?
3. What criteria the organization used to select projects?
4. How does a single project impact the elements of business logic in the case company?

1.4 The structure of this research

This research is carried out based on real project cases. It starts with topic searching and identification in terms of my interest and knowledge background. One loop was designed for monitoring and modification. The research questions will be modified based on empirical data. In addition, the literature review part will be readjusted in terms of the research questions modification.

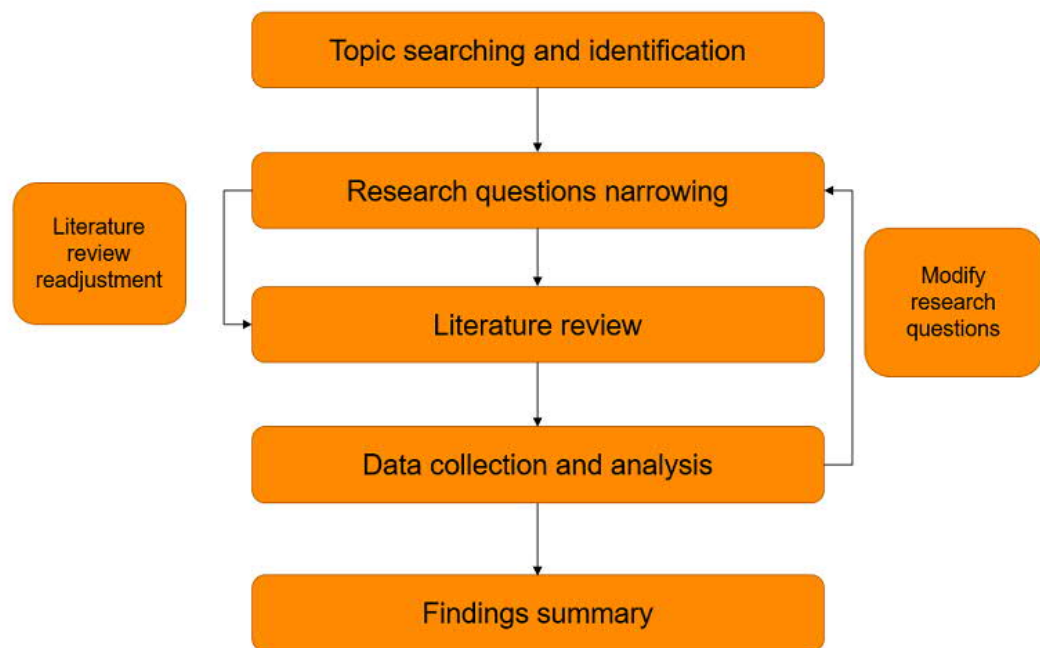


Figure 1. Research structure

2 LITERATURE REVIEW

2.1 Business model

Business model is not a new concept, which has been extensively accepted in the 1990s with the outburst of e-commerce (Magretta C., 2002; Osterwalder A. and Pigneur Y., 2005; Zott A. et al., 2011). Hedman J. et al., (2003) said that business model was a valuable tool for analysing the characteristics of a firm's business. The business model concept is also regarded as between strategy and operation by framing how the company works (Richardson, 2008a; Osterwalder A., 2004). In this context, it was initially applied to compete for lucrative business ideas to investors within a short time frame (Knyphausen A. and Meinhardt C., 2002).

A Business model affects the firm's behavior (e.g., production processes) and has a positive impact on the natural environment, e.g., resource consumption, waste production. (Martin E., & Shaheen S., 2011). Osterwalder A. et al., (2005) presented that a business model is a conceptual tool that contains a set of elements and their relationships and allows expressing the business logic of a specific firm. It is a description of the value a company offers to one or several segments of customers and of the architecture of the firm and its network of partners for creating, marketing, and delivering this value and relationship capital, to generate profitable and sustainable revenue streams. In addition, business model encourages the entrepreneur to "1) conceptualize the venture as an interrelated set of strategic choices; 2) seek complementary relationships among elements through unique combinations; 3) develop activity sets around a logical framework; and 4) ensure consistency between elements of strategy, architecture, economics, growths, and exit intentions" (Massa L., 2017).

2.1.1 Definition of business model

Business model has many definitions. It focuses on business targets such as new value proposition or value generation (Borgianni Y., Cascini G., and Rotini F., 2012). Morris M. (2003) described business model as the entire organization's work to deliver value from a systematic view. The definition of business model frame is about what customers

want, how they want it, and how the enterprise can organize to best meet those needs, get paid for doing so, and make a profit (Teece D.J., 2010).

Definitions of a business model summarized by Pekuri et al., (2013) are framed into Table 1.

Table 1. Definitions of a business model summarized by Pekuri

Author	Definition for a business model
(Timmers P., 1998a)	‘An architecture for the product, service and information flows including a description of the various business actors and their roles, the potential benefits for the various business actors, and the sources of revenues’ (p. 4).
(Hamel G., 2000)	‘A business model is nothing more than a business concept that has been put into practice’ (p. 66).
(Afuah A., and Tucci C.L., 2001b)	‘The method by which a firm builds and uses its resources to offer its customer better value and to make money in doing so’ (p. 3)
(Amit R., and Zott C., 2010)	‘Depicts the content, structure, and governance of transactions designed so as to create value through the exploitation of business opportunities’ (p. 511).
(Chesbrough H., 2010)	‘The heuristic logic that connects technical potential with the realization of economic value’ (p. 529).
(Osterwalder A., 2004)	‘A conceptual tool that contains a set of elements and their relationships and allows expressing a company’s logic of earning money. It is a description of the value a company offers to one or several segments of customers and the architecture of the firm and its network of partners for creating, marketing and delivering this value and relationship capital, in order to generate profitable and sustainable revenue streams’ (p.15).
(Seddon P.B, Lewis G.P., Freeman P., and Shanks G., 2004)	‘A business model outlines the essential details of a firm’s value proposition for its various stakeholders and the activity system the firm uses to create and deliver value to its customers’ (p.440).

(Morris M, Schindehutte M., and Allen J., 2005a)	‘A concise representation of how an interrelated set of decision variables in the areas of venture strategy, architecture, and economics are addressed to create sustainable competitive advantage in defined markets’ (p. 727).
(Shafer S.M. et. al, 2005)	‘A representation of the underlining core logic and strategic choices for creating and capturing value within a value network’ (p. 202).
(Osterwalder A., and Pigneur Y., 2010)	‘A business model consists of a number of interlocking elements that, taken together, create and deliver value’ (p. 52).
(Osterwalder A., and Pigneur Y., 2010)	‘A business model describes the rationale of how an organization creates, delivers, and captures value’ (p. 14).
(Teece D.J, 2010)	‘A business model articulates the logic and provides data and other evidence that demonstrates how a business creates and delivers value to customers’ (p. 173).
(Amit R., and Zott C., 2009)	‘A system of interdependent activities that transcends the focal firm and spans its boundaries’ (p. 216).
(Baden F.C., and Haeffliger S., 2013)	A business model is ‘a system that solves the problem of identifying who is (or are) the customer(s), engaging with their needs, delivering satisfaction, and monetizing the value’ (p. 419).

2.1.2 The role of business model in business operation

Business model as a concept tool not only has been criticized by some scholars, but also been defended (Magretta.J., 2002). As a cognitive phenomenon, business models represent the understanding of the causal links between the material exchange mechanisms of organizations and their environment which exists in manager’s minds (Baden F.C., and Haeffliger S., 2013).

Three distinct interpretations regarding the role of business model are popular: business model as attributes of real firms have a direct real impact on business operations, that is, the core logic with which an organization achieve its goals; business model as cognitive/linguistic schema, that is, the dominant logic capturing how a firm believed to

operate; and business model as formal conceptual representations or descriptions of how an organization functions, that is, business model as a scaled-down simplified formal conceptual representation (Massa L., 2017). Bidmon et al., (2018) also summarized three role of business model in societal transitions with examples from German energy sector. These three roles are: (1) as part of the socio-technical regime, existing business models hamper transitions by reinforcing the current system's stability, (2) as intermediates between the technological niche and the socio-technical regime, business models drive transitions by facilitating the stabilization process of technological innovation and its breakthrough from niche to regime level, and (3) as non-technological niche innovation, novel business models drive transitions by building up a substantial part of a new regime without relying on technological innovation.

Business model plays a lot of roles in firms' operation. Conversely, what is not the role of a business model? (Ghezzi A et al., 2014) shows six roles that business model is not, being 1) instrument for business planning; 2) instrument for external market attractiveness analysis; 3) instrument for in-depth internal core resources, competencies and dynamic capabilities assessment; 4) instrument for comprehensive and holistic strategy formulation; 5) instrument for strategy monitoring and performance measurement; 6) substitute for strategy.

2.1.3 Elements of business model

Business Model (BM) stands for a conceptual tool that contains a set of elements and their relationships and allows to express the business logic of a specific firm. (Morris S. et al. 2005b) summarized components of business model based on many researches from 1996 to 2003.

Table 2. Elements of business model (Morris S. et al. 2005b)

Sources	Specific components
(Horowitz A.S., 1996)	Price, Product, distribution, organizational, characteristics, and technology
(Albert J., and Bruce A., 1996)	Global core, governance, business units, services, and linkages

(Timmers P., 1998b)	Product/service/information flow architecture, business actors and roles, actor benefits, revenue sources, and marketing strategy
(Constantinos C M., 1999)	Product innovation, customer relationship, infrastructure management, and financial aspects
(Gordijn J., and Akkermans H., 2001)	Actors, market segments, value offering, value activities, stakeholder network, value interfaces, value ports, and value exchanges
Linder et.al (2001)	Pricing model, revenue model, channel model, commerce process model, Internet-enabled commerce relationship, organizational form, and value
(Chesbrough H., and Rosenbloom R.S. 2002)	Value proposition, target markets, internal value chain structure, cost structure and profit model, value network, and competitive strategy
(Hamel G., 2002)	Core strategy, strategic resources, value network and customer interface
(Otto P.C., Kittl R. D., 2001)	Value model, resource model, production model, customer relations model, revenue model, capital model and market model
(Gordijn J., and Akkermans H., 2001)	Products, customer relationship, infrastructure and network of partners, and financial aspects
(Afuah A., and Tucci, C.L., 2001a)	Customer value, scope, price, revenue, connected activities, implementation, capabilities, and sustainability
(Weill P., and Vitale M., 2001)	Strategy objectives, value proposition, revenue sources, success factors, channels, core competencies, customer segments, and IT infrastructure
(Applegate L.M., 2001)	Concept, capabilities, and value
(Amit R., and Zott C., 2001)	Transaction content, transaction structure, and transaction governance
(Zimmermann R., 2001)	Mission, structure, processes, revenues, legalities and technology

Johnson et al., (2008) though that business model should comprise of four interlinking elements: customer value proposition, profit formula, key resource and key processes, that taken together creating and deliver value. Richardson J et al., (2008b) proposed a widely accepted framework for business models, consisting of value proposition (including the offering, the target customer and differentiation strategies); value creation and delivery (including resources and capabilities, organization and position in the value network); and value capture (including revenue sources and the economics of the business). Artto et al., (2008) mentioned that service in project-based firm will have impact on customer entry, customer value, competitive advantage, delivery efficiency, and service business, which lead project suppliers to employ a new business model. A

service-specific business model framework was introduced by (Kujala S., Artto K., Aaltonen P., and Turkulainen V., 2010). They proposed six elements for the analysis of the key characteristics of business models in project-based firm, being customer, value propositions, competitive strategy, position in the value stream, internal organization and capabilities, and value creation logic. Osterwalder et al., (2010) developed a business model canvas containing nine blocks: value proposition, customer segments, customer relationships, channels, key partners, key activities, key resources, cost structure and revenue streams. Boons et al., (2013) suggested a generic framework composed of four elements: value proposition (the value embedded in the products/ services offered by the firm); supply chain (the relationships with suppliers); customer interface (the relationships with customers); and financial model (cost and benefits, and their distribution across the stakeholders).

From these research outcome, Saebi et al., (2017) made a summary and emphasized the following elements as necessary parts of a business model: (1) the firm's value proposition, (2) the market segments it addresses, (3) the structure of the value chain, which is required for realizing the value proposition, (4) the mechanisms of value capture that the firm deploys, and (5) the often firm-specific ways in which these elements are linked in an architecture

2.2 Business model innovation

Business model innovation is increasingly recognised to be a central part of strategic management that generates the decisive competitive advantages for a growing of organizations. Business model innovation is a specific pattern of innovation. Stampfl et al., (2016) illustrated that companies cannot simply transfer the product or process innovation pertaining to knowledge and processes, which have been developed over years, to business model innovation. Porter et al., (2004) reported that the business model innovation is more complex and has higher strategic importance than product and service innovation, as illustrated in Figure 2.

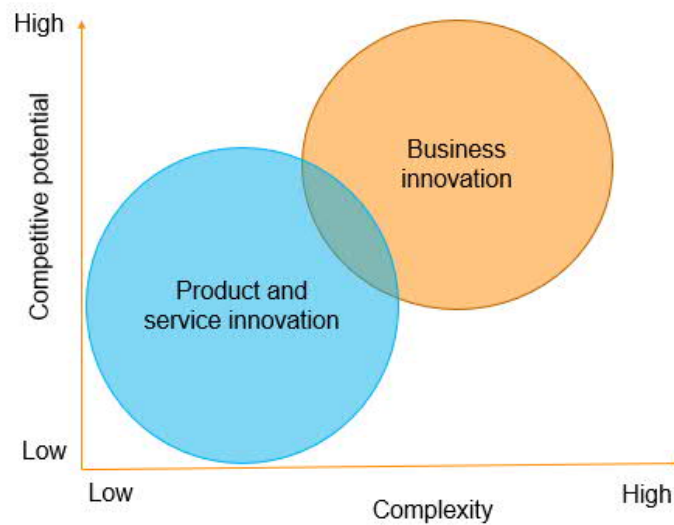


Figure 2. Comparison of competitive potential and complexity (reproduced from Porter, 2004)

Waldner et al., (2015) researched 1242 Austrian firms and found that business model innovations were in a high rate when firms were in the emergent and end stage of an industrial life cycle, as shown in below figure. In addition, they also saw the negative effect on the degree of business model and industry competition and the positive relationship on the degree of business model and innovation performance from the firm perspective

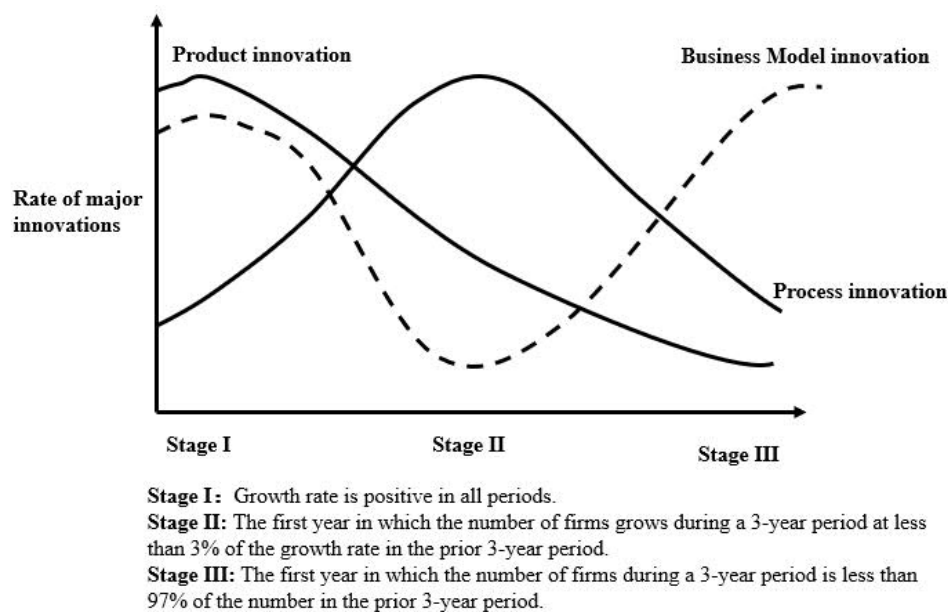


Figure 3. Assumed Rates of Business Model Innovation in the Industry Life Cycle (reproduced from Waldner F., Eurich M., 2013)

2.2.1 Definition of business model innovation

Business model innovation refers to a new integrated logic of how firm creates value for its customers or users and how it captures value, and is the implementation of a business model that is new to the firm (Björkdahl J., and Holmén M., 2013). Beattie et al., (2013) presented that business model innovation is a cross-section matter showing a high degree of interconnectedness with concepts such as resources, competitive advantage, strategy, dynamic capabilities, path dependency, and business model. Casadesus et al., (2013) summarize the essence of what business model innovation is:

“At root, business model innovation refers to the search for new logics of the firm and new ways to create and capture value for its stakeholders; it focuses primarily on finding new ways to generate revenues and define value propositions for customers, suppliers, and partners”.

2.2.2 Types of business model innovation

Stummer et al., (2010) classified business model innovation type by use of three differentiation criteria, namely trigger, degree of change and degree of novelty, into three groups, as below table.

Table 3. Type of business model innovation (adapted from Stummer et al., 2010)

Differentiation criterion	Business model innovation types
Trigger	<ol style="list-style-type: none"> 1) Business model innovations initiated through product or process innovations 2) Independent business model innovation
Degree of change	<ol style="list-style-type: none"> 1) Re-configuration of existing business model 2) Development of new business model
Degree of Novelty	<ol style="list-style-type: none"> 1) Business model is new to the world 2) Business model is new to the industry/market 3) Business model is new to the company

Sniukas et al., (2012) classified business model innovation in two fashions: 1) evolution or revolution. Business model innovation applied to an existing business is about transforming elements of the existing business models; 2) radicalness to innovation. Business model innovation applied to invention of completely new business models. (Martin G., Doroteya V., Kirsten V.F., Steve E., 2018) classified behaviours of business model innovation into new business models' development, existing business models' modification and business models' change from one business to another are.

2.2.3 Triggers of business model innovation

Changing a single business element in a way that substantially enhances a company's ongoing performance versus the competition in sales, profits and cash flow was a business model improvement and a business model replacement entailed improving at least four of these business model elements versus the competition (Mitchell et al., 2003). Business model innovation involves the discovery and adoption of fundamentally different modes of value proposition, value capture and or value creation in an existing business (Markides C., 2006). Mark et al., (2008) observed five strategic situation requiring business model change, consisting of 1) the opportunities of addressing the needs of large potential customers; 2) the opportunity to capitalize on a brand-new technology; 3) the opportunity to bring a job-to-be-done focus where one does not yet exist; 4) the need to fend off low-end disrupters; and 5) the need to response to a shifting basis of competition. Casadesus et al., (2010) researched Calatan firms and showed that the old business model will be obsolete when environment changed e.g. demographic change, globalization, technological progress.

Business model innovation are also driven by novel technology or changing environment, competition or novel market demand (Yves L.D., & Mikko K., 2010; Björkdahl J., and Holmén M., 2013). Amit et al., (2012) proposed three facets for innovating business model, including 1) by adding novel activities, for example, through forward or backward integration; this form of business model innovation refers to new activity system "content." 2) by linking activities in novel ways; this form of business model innovation refers to new activity system "structure." 3) by changing one or more parties that perform

any of the activities; this form of business model innovation refers to new activity system “governance”. Stampfl et al., (2016) illustrated five triggers which will lead to a reconfiguration of an existing business model or to the development of a new business model, being economic pressure, product development (in particular by identifying alternative applications for existing assets), customers (classifying into three subgroups customers dissatisfying with existing business model, unmet needs’ customers, and important customer), price-based competition and strategy shift.

2.2.4 Barriers of business model innovation

Business model innovation is a very specific type of innovation, requiring a different approach to innovation management and has potentially an impact on the whole business (Peter A.K., Heidi B., Ian R.E., Mike O., and Brenda L.T., 2010). The risk and financial uncertainty with business model innovation is higher than with other innovation. Business model innovation can be disruptive, when shifting from an existing business model to a new one involving a series of transition that link past, present and future, or when they change the bases of competition by altering the performance metrics along which firm competes (Danneels E., 2004).

Mark et al., (2008) outlined that managers did not understand when and how business model needed change resulted in business model innovation difficult. A new business model which had different metrics to an existing model required the firm to tailor its activities into a novel combination, which might be incompatible with its existing activity set, causing conflicts between the two ways of doing business which may necessitate various trade-off (Velu & Stiles, 2013). The challenges of business model change which involves running two models in parallel are both cognitive and economic (Yves L.D., and Mikko K., 2010; McGrath R.G., 2010).

Stephan et al., (2015) outlined six types of barriers for business model innovation. The first one is awareness-related barriers, which says that “we are imprisoned in our thinking patterns and our analysis focus is too narrow”. Then, it is search-related barriers. Openness of the search process is critical to the performance and fate of a company. The third barrier is system-related barriers. System dysfunctions, e.g. diffuse responsibility, bureaucratic issues, difficult paperwork or procedures, a lack of transparency and

feedback, as well as false incentives, turned innovators into resigned applicants. The last two barriers are logic-related and culture-related barriers. A logic-related barrier is reflected by a lack of drive, guidance and incentives to move beyond mere idea and starts thinking and acting in innovative business logic. Meanwhile, culture-related barriers refer to a small part of general issue which is something new, especially taking place from the outside.

2.2.5 Benefits of business model innovation

Johnson et al., (2008) regarded that creating a new model for a new business did not mean the current model was threatened or should be changed. A new model often reinforces and complements the core business. Business model innovation has potential to disrupt entire industries and leads to considerable competitive advantages for a focal organization (Mitchell D., and Coles C., 2003) and is conducive to redefine the way an organization creates and captures value independently of the discovery and promotion of novel technology (Markides C., 2006; Morris M., et al., 2005; Zott C., Amit R., and Massa, L., 2011). Zott et al., (2008) described that a new business model can generate and exploit opportunities for new revenue and profits streams in ways that counteracted an aging model having tied a company into a cycle of declining revenues and pressures of profits margin. Casadesus et al., (2010) concluded that reconfiguration of business model will help improve the competitiveness of Catalan firms in a market. However, if business model innovation comes from the challenge of managing the cannibalization process, firms find themselves unable to reconfigure their assets to support the new business model due to conflicts with the existing business model (Chesbrough H., 2010).

Sniukas M., (2012) exemplified four benefits by performing business model innovation:

- Companies focusing on business model innovation outperform their industry peers in terms of operating margin and total shareholder return;
- Business model innovation is the main driver of competitive advantage of companies like Southwest Airlines, Amazon;
- New business models have been key to commercializing many new technologies;
- Depending of the life cycle of your product, business model innovation might be the only you have.

Stampfl et al., (2016) specified seven benefits of business model innovation on top management-revenue growth, stabilization of revenue, predictability of revenue, higher market coverage, higher contribution margin, enhanced corporate image, and a more innovation receptive corporate culture.

2.3 Project business

Project business has been defined as “*the part of business that relates directly or indirectly to projects, with the purpose of achieving objectives of a firm or several firms*” (Artto K. A., and Wikström K., 2005). Project business includes activities positioned within the boundaries of projects and firms as well as aspects of collaboration within entire networks of multiple firms.

The four areas of project business (Figure 4) vary depending upon whether management is concerned with a project, a project-based firm, a project network, or a business network (Artto K., and Kujala J., 2008; Prencipe A. et al., 2011):

- Management of a project – addresses a single project.
- Management of a project-based firm – addresses activities of a firm involved in managing multiple simultaneous or sequential projects for the firm’s business purposes.
- Management of a project network area – addresses the management of the temporary project organization across multiple participating firms and other actors each of which have their own objectives, interests, and expectations from the project.
- Management of a business network area – includes activities in the business marketplace including several firms and their business interests, often involving multiple projects that serve as temporary business vehicles to achieve each firm’s permanent businesses.

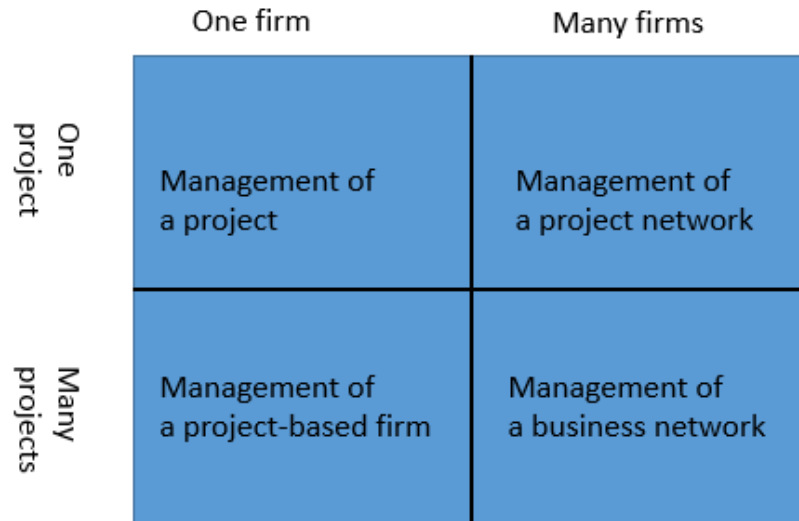


Figure 4. Framework of project business (adapted from Artto K. and Kujala J. 2008).

2.4 Project selection

Project should compete for resources with operations and other projects. Project with a strong relational and functional position in a project-based company may create a self-reinforcing cycle of successful deliveries to construct a market position (Ahola T., Kujala J., Laaksonen T., and Aaltonen K., 2013). Project selection will have a direct influence on business performance in a project-based company. Proper project selection would benefit company to optimize their scarce resources and claim profits from investments (Klein G. et al., 1986). Projects selection and prioritization is aimed at constructing and sustaining the necessary forces and resources for the accomplishment of company (Klein G., Moskowitz H., and Ravindran A., 1986).

Ross et al., (2008) pointed out that it is impossible to exactly predict the real future value of a project due to the fact that anything out of prediction may happen. Selecting a project is a complex process consisting of many factors, e.g. uncertainty (Ahola T., Kujala J., Laaksonen T., and Aaltonen K., 2013), divisibility (Liu S., and Wang C., 2011), interdependency (Santhanam R., and Kyparisis G.J., 1996), cardinality restrictions (Hu, Wang, Fetch, & Bidanda, 2008), reinvestment (Nemhauser G.L., and Ullmann Z., 1969), scheduling (Coffin M.A., and & Taylor B.W., 1996), precedence relationship among projects (Servakh V.V., and Sukhikh S.L., 2004), from the time it is proposed to the time it is selected.

Managing project selection and the associated activities throughout their life cycles are vital importance for many organizations (Jack R.M., Samuel J., Mantel J.R., Scott M., 2016). Project selection is a strategic decision, and as such should be aligned with the organization's business strategy to ensure the maximum return of the selected portfolio (Dutra C.C., Ribeiro J.L., and De Carvalho M.M., 2014; Teller J., 2013; Meskendahl S., 2010; Archer N.P.G.F., 1999). Project selection also depends on the nature and profile of the managers and on the techniques, that best fit the organization's environment (Klein G. et al., 1986). The scarcity of resources compels organizations to carry out a correct selection of their projects in the context of their portfolio, in alignment with their organization's strategy, to guarantee the accomplishment of objectives and the creation of value to their stakeholders (Simplicio, Ricardo G., Jorge R., Mário, 2017).

2.4.1 Project selection criteria

Setting and weighing the criteria of project selection is a criterial step, since an improper selection can radically alter the selected portfolio (Klein G. et al., 1986). Buss et al., (1983) pointed out four factors affecting the information processing projects prioritization, including financial benefits, business objectives, intangible benefits and technical importance. Henriksen et al., (1999) presented a flexible scoring tool of R&D project selection incorporating with four evaluation criteria-called "4R", referring to relevance, risk, reasonableness, and return. They defined that relevance was to address the degree to which the proposed project supported the organization's mission and strategic objectives and was a pursuit the organization would benefit from undertaking; risk addressed the level of scientific and/or technical uncertainty associated with the project, and to match the response scale of the other criteria, it is evaluated by assessing the probability of success; reasonableness addressed whether or not the level of resources proposed will permit successful completion of the project objectives on time and within budget; return addressed the perceived level of impact that the proposed work would have in the scientific and technical community and to the organization, if the project were successful.

Li et al., (2000) classified factors into two categories: the external factors and internal factors. The internal factors are those inherently related to the company reflecting the company's ability and present status, including its expertise, experience, financial ability,

resource possession, current workload. The external factors are those that are job related or uncontrollable by the contractor, being the nature of the work, bidding requirement, and the social and economic environment.

Strategic criteria are the basic criteria used by individual or group to assess whether they may decide (Saaty T.L., 2004). Saaty T.L. (2004) proposed a decision model considering four merits including benefits, opportunities, costs and risk (BOCR). These four criteria were also used in enterprise information system project selection by (Liang C., and Li Q., 2008). They mentioned that many effects were intangible and hard to be measured by money, e.g. standardization and improvement of business process (Sarkis J., and Sundarraj R.P., 2006), therefore only focusing on financial criteria, such as return on investment, net present value, or internal rate of return, only considering tangible or monetary effects and skipping intangible ones (Nicholas S.V., and Henry R.H., 1998), would be incomprehensive. BOCR model (Figure 5) is a comprehensive and systematic decision model which considers short-term and long-term, obvious and potential, positive and negative, tangible and intangible attributes of outcomes.

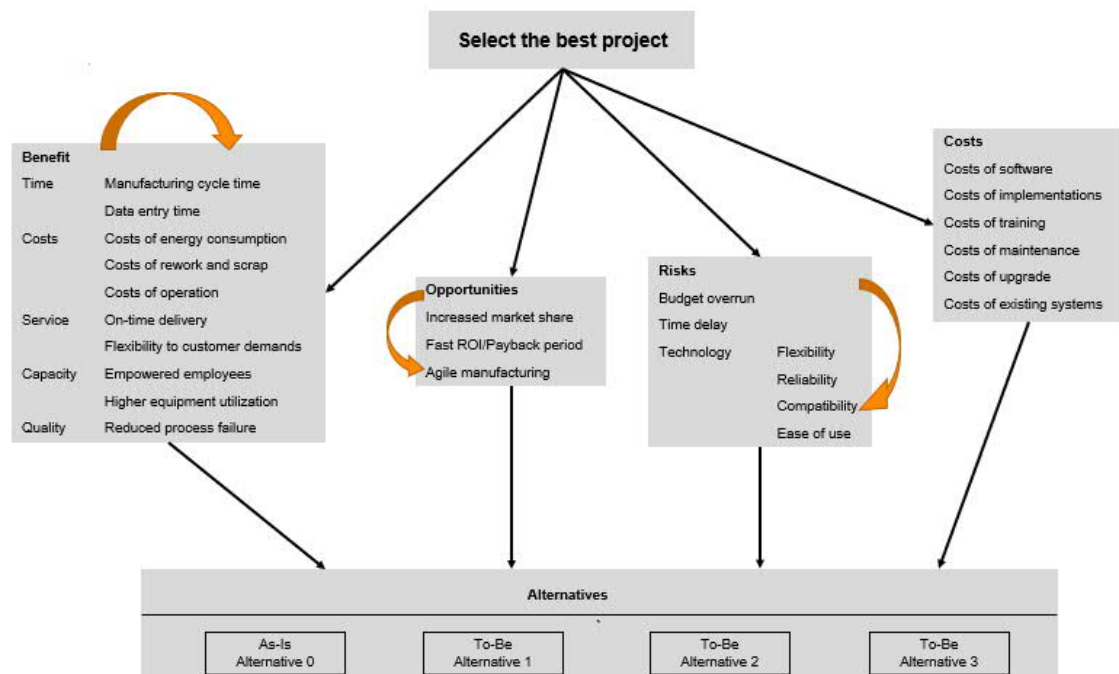


Figure 5. Generic BOCR decision model (adapted from Liang & Li, 2008)

Huang et al., (2014) took project parameters, such as initial outlays, upgrade expenditures and net cash flows as random variables and net present value as objective variable for

solving project selection and adjustment problem by use of cellular binary particle swarm optimization (CBPSO) algorithm. Pekuri A., et al., (2013) designed a project selection framework as below graphic, in which the existing business model acted as a filter for project selection to ensure projects' fitness to strategy. They found that the project selection was not guided by any specific business model in construction companies.

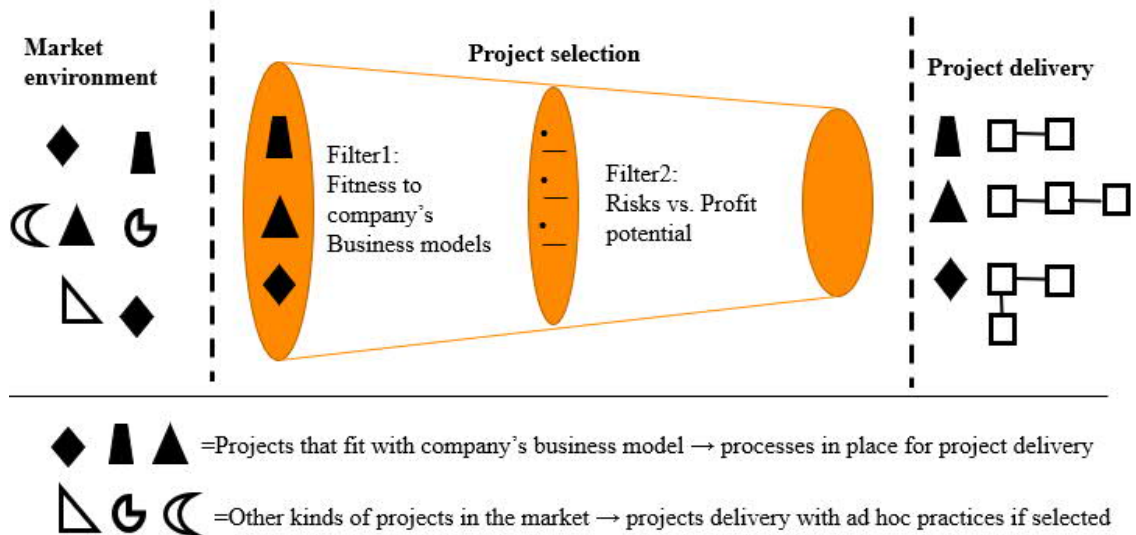


Figure 6. Framework for project selection that is guided by business models (adapted from Pekuri A. et al., 2013)

2.5 Synthesis

Scholars have used different definitions for the business model concept and there is not an agreement on which elements it should consist (Morris M., Schindehutte M., and Allen J., 2005b). Based on the above literature review of business models, we adopted the definition of business concept of (Osterwalder A., Pigneur Y., and Tucci C.L., 2005). They defined that “a business model is a conceptual tool that contains a set of elements and relationships and allows expressing the business logic of a specific firm”. In other word, company's business model is a system of interconnected and interdependent activities that determines the way the company “does business” with its customers, partners and vendors. In this research service, we will partially refer the elements of business model listed in business model canvas as Figure 7 to see how the IEM unit operates their business.

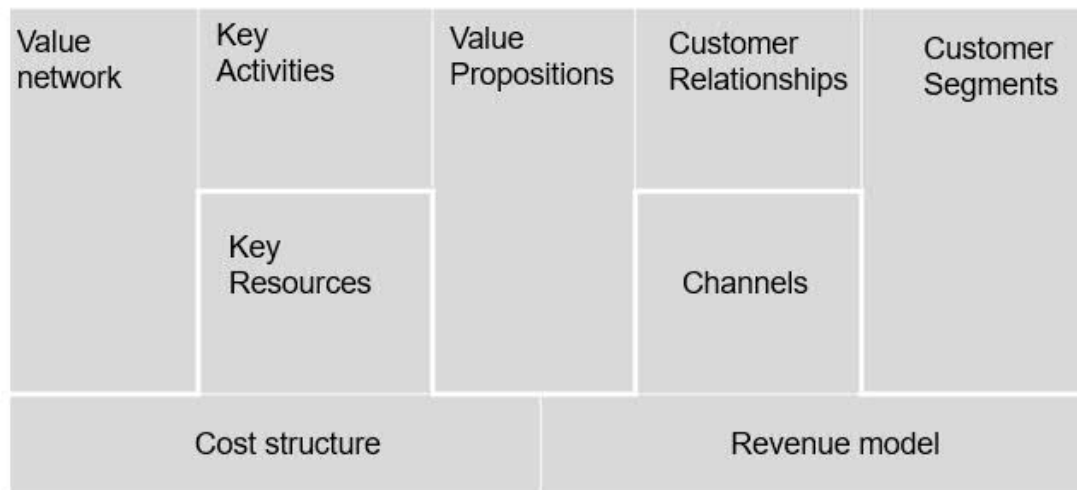


Figure 7. Business model canvas (adapted from Osterwalder A., 2010)

Kujala et al., (2010) pointed out that different project solution should employ different business models within a project-based firm. Wikström et al., (2009) concluded services have a significant influence on the business models of project-based firms from five distinct perspectives: strategy, marketing and sales, project implementation, learning and innovation and financial. Artto et al., (2008) researched what is "project strategy" by defining project as a temporary organization or entity. They defined three dominant tracks of project including 1) projects are viewed as subordinate to the parent organization on the assumption that projects belong under the control of one strong parent organization; 2) Project as an autonomous organization but connected to parent organization; 3) projects are considered as organizations that are not subjected to clearly defined governance or authority setting in relation to their surrounding organizations or stakeholder organizations. In this research, we also see a single project as an entity or a temporary organization.

Finally, we adopt the definition that business model innovation is the search for a new logic of a firm and new ways to create and capture value for its stakeholders. In addition, the behaviours of business model innovation are comprised of new business models' development and existing business models' reconfiguration.

3 RESEARCH METHODOLOGY

This research is to explore the management practices of the case organization in operating its businesses. Research questions are made up of “how” and “what”. It means that we need to observe the detailed description of people’s activities, behaviours, and actions, but we would not do any quantitative measure and comparison. Qualitative methods allow the data evaluator to investigate a specific issue in depth and details and produce detailed information about a much smaller number of people and cases. Therefore, we choose qualitative methods as our research methodology.

Qualitative research, not like quantitative research which transforms numerical data (measurable data) into the statistic, is exploratory. Qualitative research is used when the subject needs 'intricate details' and understanding (Ghauri P.N., and Grønhaug K., 2010). Miles et al., (1979) also present that qualitative research is a holistic approach with minimal distortion. Qualitative approach is used when the research questions are subjective, behavioural (Kothari, 2004; Ghauri P.N., and Grønhaug K., 2010). Creswell et al., (2013) believes that qualitative research is like a "fabric made of different colors, threads and design".

Case study is one of the qualitative research methods which provides an insight into a study (Ghauri P.N., and Grønhaug K., 2010). Also, case studies provide a detailed investigation in a research report. Yin R.K., (2014) identifies that a case study approach is used when the research questions are "How" and "Why" questions and when the investigator has little control on context. The case study method helps to understand the process of changes present within single settings (Eisenhardt K.M., 1989). The case study helps to collect unstructured data and do a qualitative analysis of those data (Yin, R.K., 2014). Therefore, a case study method is an applicable method to study operational behaviour in a project-based firm.

The main part of a case study is to get into the details of a case. Besides the literature analysis, we used in-depth, semi-structured interviews and document/report review to collect data. The two elements of an interview are interviewee and question structure. Interviewees choosing is very critical for data collection. Interviewees in this study are

professors at the University of Oulu. They are well-experienced in project management and business operation. They have at least 25% of their workloads on their case project. In addition, they also are taking charge of the main activities e.g. communication, consulting and organizing, and supervising in this case project.

At the same time, open-ended questions and a non-judgemental and unbiased approach ensured openness to new input from respondents. All interviews were recorded and carefully transcribed. The interviewers took notes during all of the interview sessions. Finally, the resulting transcripts were reviewed for accuracy.

4 INTERVIEW DATA SUMMARY

The case organization of this master thesis is the Industrial Engineering and Management unit of the Faculty of Technology at the University of Oulu. We call it the IEM unit. The IEM unit has multiple projects. We selected two on-going projects randomly, namely digital age production park, called Digital project in the following, and Monikansallisten investointiprojektien johtaminen project, abbreviated to MILL project to explore these research questions.

We interviewed project managers and the head of each project. They have been working in the IEM unit over 10 years. For example, Prof. Harri Haapasalo, the director of the IEM unit and the head of MILL project, witnesses the development and evolution of the IEM unit and involves into multiple projects. In addition, he also is lecturers of several courses, e.g. product management, technology management. The interview contents include project-related questions, e.g. why the IEM chooses these two case projects to process, and business model-related questions. Interview questions are listed in Appendix 1.

4.1 Case organization overview

4.1.1 The evolution path of the case organization

The IEM degree program was opened in 1991, which was affiliated in the faculty of technology. The degree program is the core business of the IEM unit, in which students take courses to get corresponding credits and finally gain degree certificate. At that time, the IEM unit's main courses were focusing primarily on two areas, namely, work science and industrial management which were managed by the department of process engineering and the department of economics respectively. In 1998, quality management in the department of economics was introduced into the IEM degree program. Subsequently, project management in the department of economics was also drawn into the IEM degree program in 2002. The new introduction of project management and quality management led to a chain of action on the degree program, e.g. integrating resource, enlarging courses, changing students' study plan. In 2003, the IEM unit was

officially established. Activities of all research areas in the IEM degree program are separated from the management of their original departments and were managed and led by the IEM unit. The biggest change resulting from the establishment of the new department was the faculty-level organizational structure change, which directly led to the change of operation of the degree program. Before merging, course-related activities were conducted by two independent departments-the department of process engineering and the department of economics. Since 2003, all course- and research-related activities were carried out by the IEM unit.

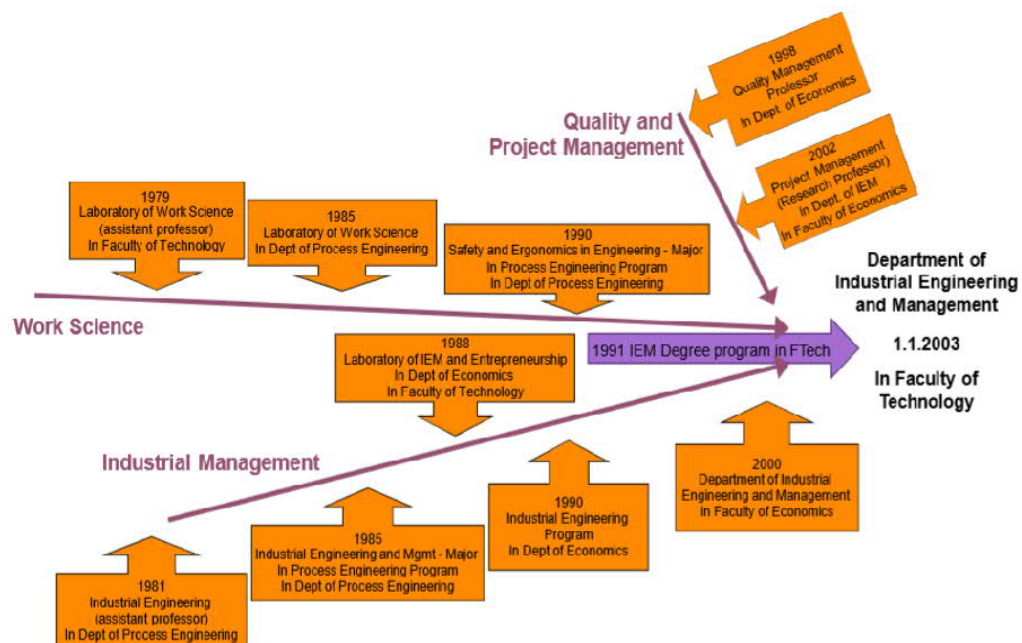


Figure 8. Evolution path of the IEM unit (adapted from IEM unit, 2019)

During fifteen years after the IEM unit was established in 2003, the IEM unit restructured its department-level organizational structure by introducing new research areas, renaming and expanding the existing research areas to optimize and position its value proposition and offerings. In 2012, the IEM unit renamed Work Science to Wellbeing at Work and Productivity and added product management due to companies' needs and the desire of precise focus on research areas. In 2014, the IEM unit divided its master's degree into IEM Finnish master's degree programme and international master's degree programme. This change brought about changes in operations, e.g. teaching language change from Finnish to English.

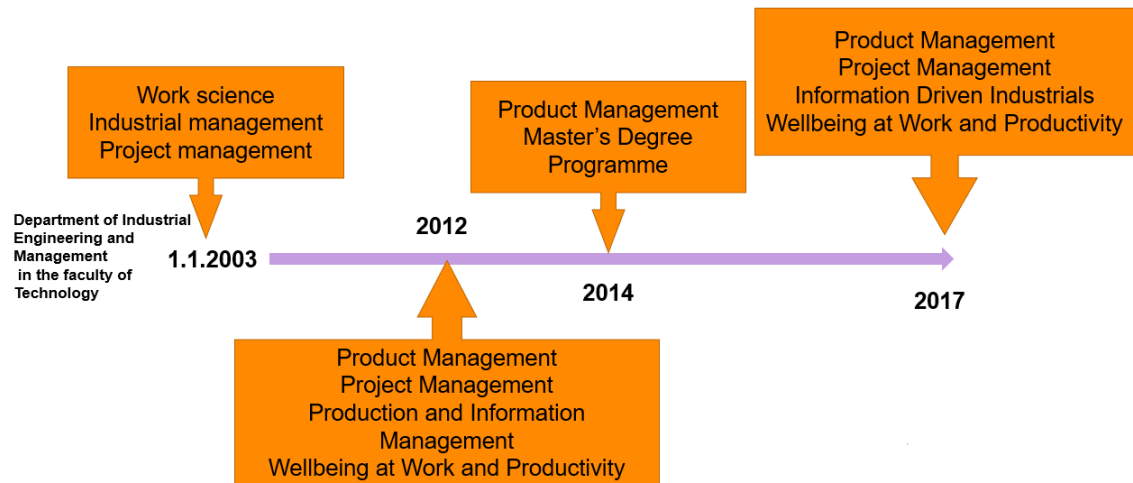


Figure 9. Development path after IEM unit establishment (adapted from IEM unit, 2019)

4.1.2 The status quo of the case organization

The IEM unit works as an independent research unit to run research projects. At present, there are around 30 staffs. There are six professors in 30, being 4 full-time professors, 1 research professor, 1 associate professor. The remaining 24 is comprised of lecturers, researchers, and doctoral students.

One of the IEM unit's core businesses is the degree program, including a bachelor's degree program, a master's degree program, and a doctoral degree program. Research service is also an indispensable offering that the IEM unit provides. Since 2003 till 2018, the IEM unit had published around 350 articles on four research areas over nine business sectors, as below Figure 10. The four research focus areas are comprised of product management, project management, information-driven industry, and wellbeing at work and productivity. All of these research focus areas have professors as responsible leaders and they are self-steering in planning the research activities together with the researchers, lecturer, and doctoral students.



Figure 10. Overview of the research project by business sector and research focus area (adapted from IEM unit, 2019)

4.2 Case projects' overview

In this chapter, we will introduce the origin of the two case projects and their operation-related contents, e.g. cost structure, customer, fund, and partners.

4.2.1 Introduction of two selected case projects

➤ *Digital age production park project*

Digital Age production park project was launched by Sievi industry park Ltd in 2016 for creating a new world with innovation, novelty in competitiveness and remote cooperation by using digitalization and future manufacturing technologies. This project benefits to effectively convert the manufacturing technologies and methods revolutionizing industries into the competence of start-up and existing small and medium-sized companies. There is a tripartite team- consisting of start-up companies, manufacturing companies, manufacturing technology companies, shown in Figure 11. The existing manufacturing companies offer manufacturing services for the start-ups, while start-up companies can work as subcontractors for existing manufacturing companies. Meanwhile, the manufacturing technology companies offer the newest manufacturing

technology and development services of production line for start-up and existing manufacturing companies.

Universities also take an important role in this project, who provide the best competence on know-how and international networks for the tripartite team, as shown in Figure 11. The six forges in this project are future forge, innovation forge, competitiveness forge, business forge, experiment forge, and start forge, representing different competence from universities. IEM unit at the University of Oulu is the responsible organization of business forge in this project who offers the innovation coaching and network of innovation laboratories to companies so as to develop and experiment business for improving competitiveness. In addition, they also help the tripartite team to test and experiment their business model to discover the new ways of operating business.

Empirical data are valuable data for Universities' research service. The tripartite team of this project can provide more empirical data to achieve the combination of theory and practice. Moreover, more master thesis position will be generated because of heavy workload.

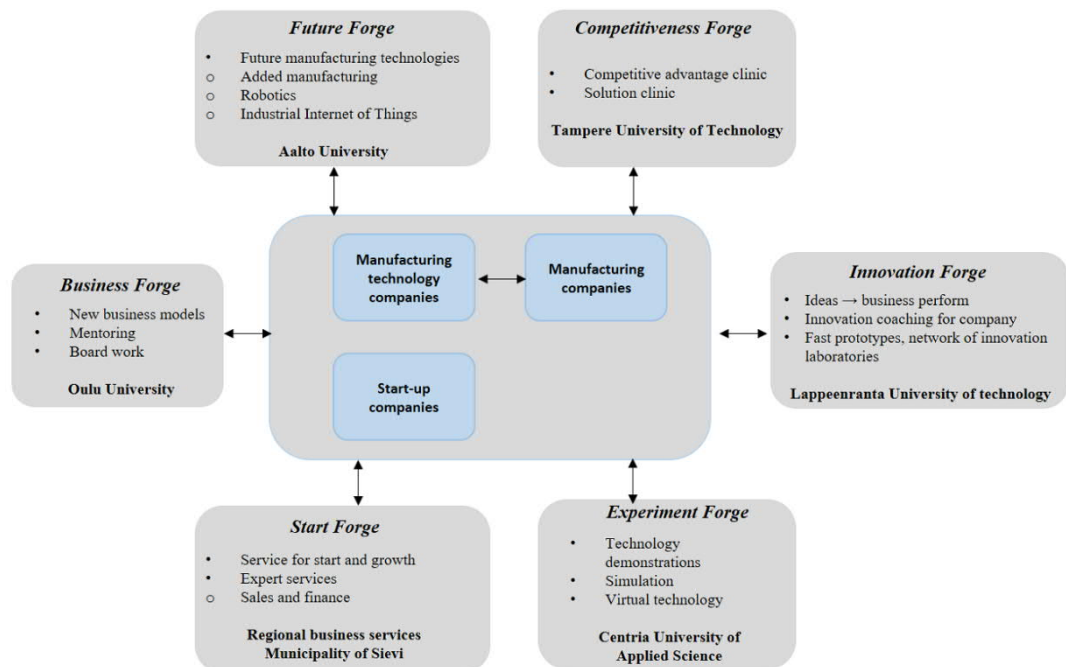


Figure 11. Roles of main stakeholders in Digital project (adapted from Esko S., 2016)

➤ **Introduction of MILL project**

MILL project got funds of around 500,000 Euro, whose research service can be divided into different work packages that include current state analysis of the best practices of managing international projects, regular thematic workshops, development of different kinds of management frameworks and assessment models, benchmarking of world-class project cases and the rapid and broad distribution and communication of the research results through various channels.

The outcomes of the project include a world-class, standardized management model for integrated international investment projects and various best practice guidelines, frameworks and assessment tools for the management and leadership of international investment projects. In addition, a simulation model that supports the evaluation and analysis of the implications of different contractual and commercial models and project management practices will be developed in the MILL project.

The MILL project will have regional and societal effects on multinational project investment. The main case company of MILL project is Ferrovan.Oy, which puts sustainability as an attribute of business development. MILL's research service will subvert the old business model in the mining industry and will provide a highly effective and efficient collaboration framework to integrate all players and to make profits at the maximum for all players.

4.2.2 Project selection and selection criteria of two case projects

The two case research projects are led by different research teams with different expertise. The Digital project is led by the research team of Wellbeing at Work and Productivity, while MILL project is managed by the research team of Product management.

Digital project (Digital age production park project) is initiated by Centria University of Applied Science. It is quite small if calculating by money investment, which occupies 5% of the IEM's budget. Before getting fund from the outside of an organization, the IEM research team has ever discussed the kill/go decision on this project because the fund model of the Digital Age Production Park project is not optimal. If deciding to continue with this project, IEM should invest money on it by themselves. Even though there was a fund problem, the research team still did not finally kill this project but decelerated its

progress. The topics of this project-business model, production process development, and business mentoring are fitting well with the research education that IEM unit is providing. This project will offer some opportunities as well, e.g. quick access to empirical data of companies, good cooperation with companies. These opportunities benefit the on-going research service and case courses opened to students.

The location of potential customers, e.g. start-up companies, small- and medium-sized companies, is in Sievi. Sievi industry park Ltd. is a leading actor, who will be responsible for leading this project, including coordinating other players, looking for companies, and testing and experimenting with new concepts. From a geographic perspective, it is totally new to the IEM unit, who never cooperated with companies in Sievi yet. The capital investment of this project is very small, but the customers are projected up to 30. Working with these customers simultaneously is also new to the IEM unit. Hence, it will require the IEM unit to develop the capability for the remote work and to develop a network to work with several companies at the same time. The digital project got fund from the European Regional Development Fund in August of 2018 and hired a research assistant to full-time work on this project.

MILL project started from a request of Oulu Chamber of Commerce. The topic definition experienced several rounds' discussion among three parties- the IEM unit, Oulu Chamber of commerce and case company- Ferrovan Oy. Its agreed deliverable is an advanced project management framework for multinational and high investment projects. This framework will innovate the business operation for a more effective and efficient project execution. It encompasses three critical topics-collaboration, connection, and localization. From the research content perspective, IEM unit has carried out similar research service on collaboration implemented in construction industry projects. The IEM has strong competence and solid resources in implementing this research service. In addition, case company-Ferrovan Oy will build its factory near Oulu and will open more than 150 jobs in 2020. Early involvement with employers' needs will help get first-hand information on what kind of talents Ferrovan Oy will need in the future so that the IEM unit can develop new courses accordingly.

To sum up, the interviewees mentioned fund availability, compatibility of education, obtainability of empirical data, close cooperation with companies, innovativeness of research content, competence availability, and resource availability when answering the questions of what criteria they were using for selecting a project.

4.2.3 The summary of two case projects

The Digital project started with a request call of the Centria University of Applied Science. The IEM unit plays a know-how role in the business model and innovation development. The solution service includes business mentoring, business model experimenting and testing, which will help companies to explore new product services and increase competition. From education perspectives, it also will enrich the course material of the Market Lab course with real case scenarios. After getting fund from the EU fund organization, the project eventually went to the implementation phase. A research assistant was hired to carry out this project. This research assistant needs to take responsibilities of collecting data, processing data and finally give satisfying results to customers by training. The customers are start-up companies, small- and medium-size companies in Sievi.

MILL project started from a request of Oulu Chamber of Commerce, which was funded by four groups, 15% from the company, 70% from EU organization, 5% from two cities, and 10% from IEM unit. MILL project focuses on the research of collaborative project management framework within a multinational project and will develop an advanced project management framework to help big investment projects improve collaboration based on case company's specific operating environment. From a content perspective, it is the extension of previous research outcome conducted in construction industry and will enrich the course material of stakeholder and communication management in the course of Advanced Project Management. In this project, the Oulu Chamber of Commerce is a coordinator and sponsor of MILL project and Ferrovan.Oy is the case company in which the new business model will be tested and experimented. In order to complete this project, two master's thesis workers were hired. The project manager of this project is a research assistant in charge of project coordination, data collection and processing, and outcome training and publishing.

5 CASE PROJECTS' ANALYSIS

According to information gathered by interviews and reviewing the meeting report, we observe that the IEM unit uses two business models to operate degree program and research service. In addition, we understand that the IEM unit does not formulate a project selection procedure in a written document, but there is a tacit process in all workers' mind for selecting a project. In this chapter, we will answer the four supportive questions of this thesis.

5.1 The business models in the IEM unit

In this section, we explore the business logic of research service and degree program in the IEM unit by referring to the elements listed in the business model canvas. Given that respondents said that customer relationship was maintained and managed by the University of Oulu, we cut customer relationship off and used offerings for substitute. This section will answer the following two questions.

- **RQ 1.** *What is business logic in the case organization?*
- **RQ 2.** *What elements were included in the case company's existing business logic?*

5.1.1 The business model of research service in the IEM unit

Referring to the operation of the two case projects, every research project in the research service of the IEM unit is an entity with its own independent cost and revenue structure. The main component of cost is personal salary. The cost of overhead is a very small part of the cost structure of the research project. For the revenue model, it differs from projects relying upon the size of the research project and other factors. Usually, the IEM unit applies for the fund from four sources, namely EU funding organizations, Finnish companies, University of Oulu, other organizations. Although the cost and revenue management tool are the same among research projects, each project's cost and revenue are separated from each other. The value proposition of research service is versatile depending on research topics and contents and value network, e.g. stakeholders.

For research service, the IEM unit offers solutions and know-how for a specific problem by working with companies and other joint research partners. By analysing the two case projects, we summarize the elements of the general business model of operating research project in IEM unit in Table 4.

Table 4. Elements of the general business model of research service in the IEM unit

Business model elements	Description of business model's elements of research service
Value Proposition (How does IEM unit promise to create value for its customers)	Research service-play a role of know-how in the focused research area, namely product management, project management, information-driven industry, and wellbeing at work and productivity, in providing a solution for a company's specific problem. Depending on the research's topics, these solutions may be helpful for cost reduction, risk reduction, project selection, process optimization.
Customers (who are the customers of the IEM unit)	Customers are companies and the whole society.
Key activities (what activities are carried out)	Data collected by phone call, workshop; face-to-face meeting with customers and other stakeholders, or other remote ways; Data processed by researchers with expertise, research outcome delivered by publishing article or academic conference, or training tool.
Key resources (what resource does the IEM unit have)	Own staffs-being professors, researchers, lecturers, and doctoral students. According to project needs, new employees with fixed-term contract will be hired.
Revenue model (how does IEM unit get capital to operate its offering)	Every research project has their respectively independent fund' components. It can be fully funded by European unite funding organization or jointly financed by several organizations, e.g. companies, cities.
Value network (how does partnership work)	Partnership strategy is aiming to increase odds in obtaining funding from other organizations, except the Finnish government. Partners are other educational organizations and companies.
Offerings (what are the content of product)	Solution service on product management, project management, information-driven industrial, and wellbeing and productivity.
Channels (how is IEM unit reaching customers)	Open call of EU fund organizations and academic Finland, company's request, project proposal to business Finland.

Cost structure (costs incurred to deliver offerings)	Personal salary, and overheads.
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5.1.2 The business model of degree program in the IEM unit

The operations of the degree program are different from research service in terms of various dimensions, such as activities, channels, and sources of fund. The main customer of the degree program is students inside and outside Finland. Its revenue is completely from the Finnish government, accounting for around 50% of yearly revenue in the IEM unit. The IEM unit designs and opens various courses and gives advice on study plans to students. Students choose courses according to their own future job orientation needs. In addition, students also need to complete the tasks as all courses required, then they can gain the corresponding credits.

The elements of the degree program's business model are explained in Table 5 based on the explanations of interviewees.

Table 5. Elements of the degree program's business model in the IEM unit

Business model elements	Description of the business model's element of degree program
Value Proposition (How does IEM unit promise to create value for its customers)	Degree program- Students get knowledge and skill by taking courses and gain a degree certificate, which will be beneficial for them to find a professional job.
Customers (who are the customers of the IEM unit)	Customers are students including local and international students
Key activities (what activities are carried out)	A set of courses covering advanced knowledge on product management, project management, information-driven industry, and wellbeing at work and productivity was instructed by face-to-face teaching with students; seminar; case study; E-learning.
Key resources (what resource does the IEM unit have)	Own staffs-being professors, researchers, lecturers, and doctoral students.

Revenue model (how does IEM unit get capital to operate its offering)	Degree program is completely funded by the Finnish government,
Value network (how does partnership work)	Partnership with other universities, e.g. Erasmus program; student can go to exchange to other universities through partnership programme.
Offerings (what are the content of product)	Degree program: bachelor's degree, master's degree and doctoral degree
Channels (how is IEM unit reaching customers)	Entrance exam, international application platform
Cost structure (costs incurred to deliver)	Personal salary, overheads

5.2 Research project selection process and criteria in the IEM unit

The IEM unit don't have a well-documented selection process and selection criteria-set. In this section, we will answer the below question.

- **RQ 3.** *What criteria the organization used to select projects?*

After comprehensively analysing the two case project's selection practices, we conclude that the research project management process in IEM unit consists of four phases, being project initiating, project selection and planning, project implementing and project closing (see Figure 12).

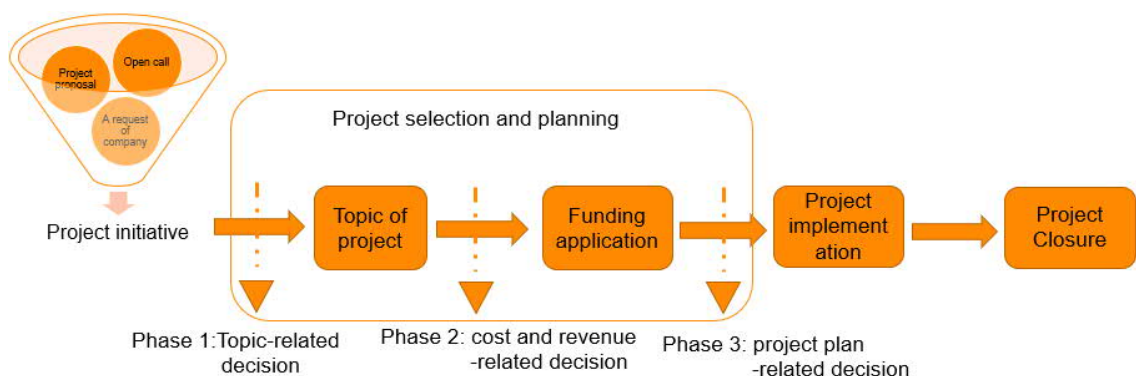


Figure 12. Project management process in the IEM unit

IEM unit has four sources to get a new research project. One is that the IEM unit proposes its new research project to a fund organization called Business Finland. The second and third ones are the open calls of academic Finland and EU fund organizations. The last one is a request of a company. After a project was initiated, the head of the project will appoint a project manager to take all responsibilities of managing the project. The project manager will be the final decision-maker of the project. The project selection is implemented in the project selection and planning phases and comprises three phases of decision-making. The decision-making process is outlined in Figure 13. In each decision-making phase, more than one questions should be answered depending on the criteria for decision-making.

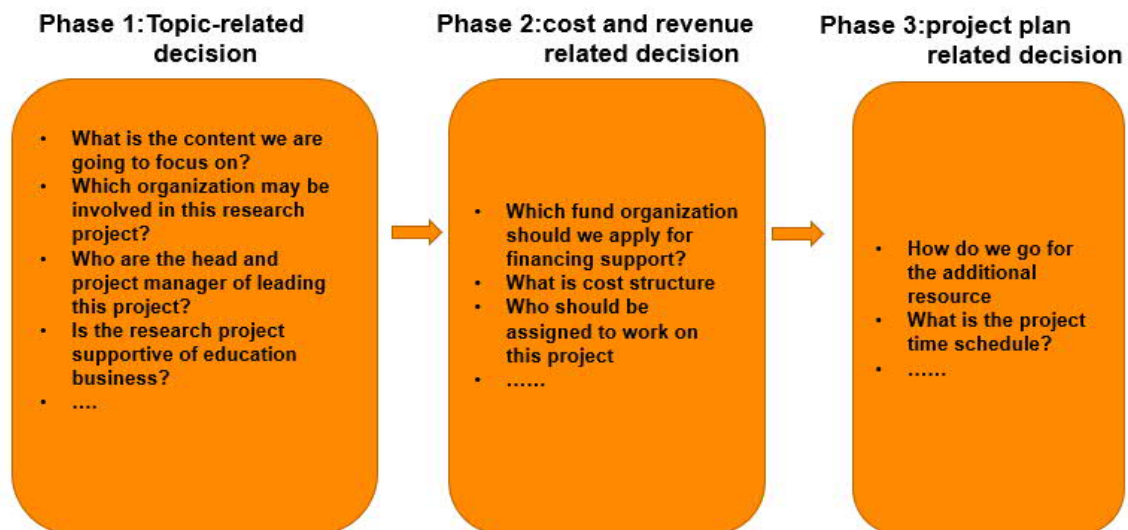


Figure 13. General decision-making process

The IEM unit does not have a well-documented criteria-set for selecting a project. In terms of the above description of the selection of the two case projects, we listed the project selection criteria of the IEM unit in Table 6. There are two compulsory criteria: fund availability and compatibility of education. The Ministry of Education requires that all research service must be supportive of delivering the degree program. Following this mandatory clause, the IEM unit puts compatibility of education as a critical and decisive criteria of project selection. Fund availability directly decides the start time of a project. The remaining criteria listed in Table 6 are optional. The IEM unit chooses which one should be considered for decision-making according to the trait of each project.

Table 6. Project selection criteria in the IEM unit

Selection criteria	Status
Fund availability	Compulsory
Obtainability of empirical data	optional
Close cooperation with companies	optional
Compatibility of education	Compulsory
Innovativeness of research content	optional
Competence availability	optional
Resource availability	optional
Others (as defined)	optional

5.3 The impact of a single project on the elements of business model

In this section, we will explore the answer of RQ 4.

- **RQ 4.** *How does a single project impact the elements of business logic in the case company?*

We first summarize the impact of a single project on the elements of business models in Table 7. Then we explained how a single project influences the two business models in details.

Table 7. Impacts of a single project on elements of two business models

Elements of Business model	Business models of the IEM unit	
	Research service	Degree program
Value proposition	<ul style="list-style-type: none"> • Know-how of new research areas 	X (not applicable)
Customer	<ul style="list-style-type: none"> • Enhance perceived value 	<ul style="list-style-type: none"> • Enhance perceived value
Key activities	X (not applicable)	<ul style="list-style-type: none"> • Enrich course material • Develop new courses
Key resources	<ul style="list-style-type: none"> • Foster skills • Develop new competence 	<ul style="list-style-type: none"> • Foster skills • Develop new competence
Revenue	X (not applicable)	X (not applicable)
Value network	<ul style="list-style-type: none"> • Build a new partnership with new partners 	X (not applicable)

Channel	X (not applicable)	X (not applicable)
Cost structure	X (not applicable)	X (not applicable)
Offerings	<ul style="list-style-type: none"> • Introduce new research areas • Extend of existing research areas 	X (not applicable)

➤ *The impact of a single project on the elements of the business model of the research service*

All research projects have the involvement of real companies as either data providers of research data or test beds of research results. From company's perspective, a research project is seen as a consultancy or solution service to find a solution for company's problem or to provide the company suggestions on how to solve its challenges by optimizing and innovating its operation processes. By analyzing the two case projects, we find that these two case projects do have a direct impact on value network, offerings, and value proposition of business elements in the research service's business model, but do not impact their cost and revenue structure, key activities, and channels. Cost and revenue structure, key activities, and channels are unique and separate from each research project.

Every research project will have individual case companies and other joint organizations, e.g. universities, being involved to take their own responsibilities. The Digital project and MILL project help the IEM research unit build a new partnership with the external organizations, e.g. Sievi industry park Ltd., Centria University of Applied Sciences, Oulu Chamber of Commerce, and Ferrovan, as shown in Figure 14.

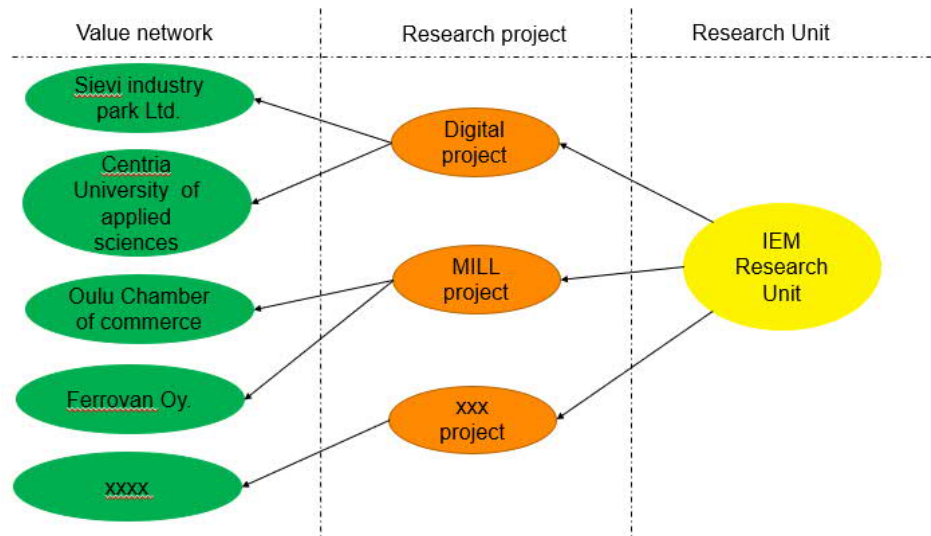


Figure 14. Value network linkage with the research project

The IEM unit categorized its research service by business sector and research focus area. A research project itself can outreach the research field of IEM unit by either the business sector or the research focus area. The Digital project and MILL project are not new to IEM unit from the research focus area perspective, but new to the IEM unit from the business sector perspective. Hence, it will extend the range of the business sector. With the involvement of more new research projects, either a new research focus area or a new business sector may be introduced to the IEM unit, as pink rectangles showed in Figure 15. Except that, the IEM unit's offerings can be extended on the basis of the existing research service.

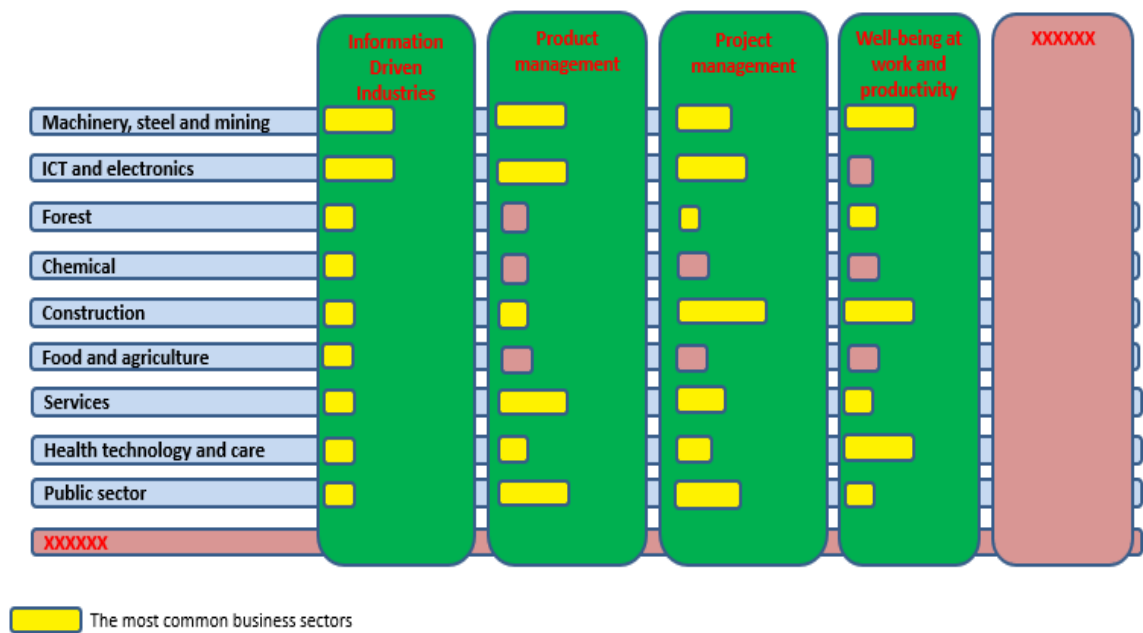


Figure 15. Extension and introduction of a new research project

➤ *The impact of a single project on the elements of the business model of the degree program*

Students in the degree program are not only called customer, but also a core member in implementing activities (e.g. attend courses and complete the assigned course tasks) of delivering the degree program. Figure 16 lists the activities of students and the IEM unit for delivering degree program offering. The IEM unit's main activities in delivering degree program are courses' feature definition, courses design including teaching materials and methods, and evaluating student's performance or mastery level of their equipped skills and knowledge. Students choose courses according to their study plan and participate in the execution process of courses to equip themselves with advanced knowledge and skills.

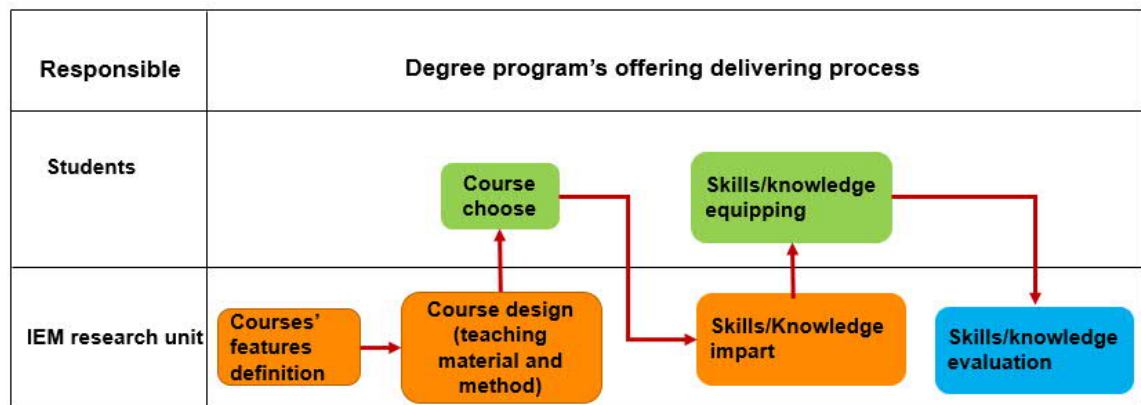


Figure 16. The activities of two parties-Students and IEM unit

In terms of the feedback of respondents, we conclude that the two case projects would not have influences on cost structure, offering, revenue model, channel, value network, and value proposition of degree program, because these elements do not have a connection with the operation of a research project. However, the two case projects still have sustainable and valuable influences on key activities and resources of the business model of degree program through enriching the course materials and increasing or changing human resources.

First, the degree program and research service share the human resource in the same resource pool. By engaging in a research project compatible with and supportive of the activities of delivering degree program, professors and lecturers will get first-hand data of different real cases. Professors and lecturers then may convert real cases into teaching materials and finally convey to students. For example, the respondents in Digital project mentioned that the real case will be useful and valuable for the course of Market Lab. Thus, a research project serves as a nutrient generator to feed lecturers and professors with practical scenarios, as illustrated in Figure 17. Some well-educated students may turn into being the developer of a research project as a doctoral student or master thesis' worker to implement other new research projects. For example, in the MILL project, two master's degree students are hired to do the relevant researches.

6 CONCLUSION AND LIMITATION

6.1 Conclusion

A project-based organization is an organization that manages multiple projects simultaneously for a firm's organizational goal (Artto K., and Kujala J., 2008). Business model consists of a set of elements to express the business logic of an organization (Osterwalder A., 2004). Johnson et al., (2008) reported that more than one business models existing in a firm does not mean they will threaten each other. A new business model may reinforce an existing business model.

Project is the primary unit of research service. It can be defined as the activities with a defined set of resources, limited time, and goal. The IEM unit is a project-based organization, which manages multiple on-going projects simultaneously. The IEM unit has two business models to deliver value for its customers and partners. One business model is to implement the value proposition of educating students with advanced knowledge and skills through a long-term and continuous process. The other one is to manage the value proposition of developing know-how solution on research focus areas and create value for its customers through the project. The two business models in the IEM research unit are interdependent because they share the same human resources. Moreover, one compulsory criterion of project selection, compatibility of education, requires research project valuable to and supportive of education. We conclude that the business model of research service in the IEM research unit reinforces and complements the resources and activities of the degree program and enhances the perceived value of students through enriching teaching material and training lectures.

Business model innovation refers to discover a new business logic different from the existing business model to create value for customers (Casadesus et al., 2013). Stummer et al. (2010) categorized business model innovation types by the degree of change into the reconfiguration of the existing business model and development of a new business model. Past researches demonstrated that cost and revenue renovation was the most forceful elements to drive companies to innovate their business model (Kujala et.al. 2008; Osterwalder A., and Pigneur Y., 2010; Casadesus et al., 2013). However, cost-driven and

revenue-driven business model reconfiguration cannot fit the industries with non-profit attribute. The IEM unit at the University of Oulu is a non-profit organization with the mission of serving the advanced education to students and of generating cutting-edge research service to society. Its cost components and revenue system are not complex. The majority of the cost is personal salary and the majority of revenue comes from Finland government and fund organizations. Thus, cost-driven and revenue-driven business model innovation would not work on the IEM unit due to no profit pressures.

Main RQ *how a single project impacts business model innovation in the case organization*

David et al., (2005) concluded that projects can work as a strategic arena to develop new capabilities. In last chapter, we conclude that a single research project plays an irreplaceable role in the value network, value proposition, and offerings of research service. A research project new to the IEM unit either on research focus area or on research business sector might develop new research focus area or might extend the existing research focus. For example, the research focus area, product management, was introduced in 2012 to the IEM unit. Introduction of new research focus areas means new offerings and new value proposition. Extension of the existing research focus area refers to either the strength or the outreach of the existing research outcome.

The two case projects - Digital project and MILL project, have some areas, e.g. business sector, customers, new to IEM unit. The main interviewees of these two case projects said that “*we have strong experience in leading this kind of projects, so we would not reconfigure the existing business model or develop a new business model for this project*”. These two case projects are in progress and the current activity system can sufficiently support the operation of these two projects, so it is obvious that the interviewees don’t know what research results will be and how their results will influence the business element of the IEM unit’s business model.

Integrating the history of the development of the IEM research unit, we discovered that the IEM unit in the past 15 years had re-configured its value proposition and offerings of research service for several times and all reconfigurations of value proposition and offerings were initiated after projects were done. For example, interviewees said that

renaming Work Science to Wellbeing at Work and Productivity in 2012 was triggered by a research project about Wellbeing at Work. The reason of renaming research focus area is because a new name can exactly reflect the customer's needs and the precise research focus of the IEM unit, as the interviewee said that *"we rename a research focus area according to market needs or for exactly describing the research focus"*. Renaming research focus area will greatly influence customer's value perception. Interviewees also quoted *"change or die"* to emphasize the importance of renaming the research focus area. Combining the evolvement path of the IEM unit and what interviewees said, we observe that renaming research focus area is the result of reconfiguration of offerings and value proposition.

The core element of the business model, value proposition, might lead to business model innovation (Chesbrough et al., 2007). Mitchell et al., (2003) presented that changing a single element of a business model in a way was a business model improvement and a new business model development entailed improving at least four business elements of business model. Stamfle.G (2016) described that *"transforming the core elements of the business model without changing products or processes can form the basis of a business model innovation"*. We conclude that a reconfiguration of the existing value proposition and offerings and an introduction of a new value proposition of research service will drive business model innovation, as outlined in Figure 18.

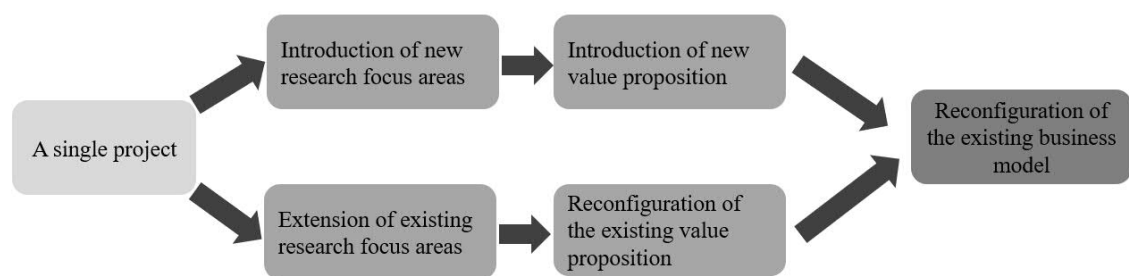


Figure 18. The impact of a single project on business model reconfiguration of research service

Moreover, we also noticed one kind of phenomenon that a single research project positively impacts on the key activities and resources of degree program. The course contents of the degree program might be enriched by converting the projects' real scenarios into teaching materials. The research results of a research project also will be developed to be new courses if the research results can substantially concentrate on what

students need for job success or can help graduates get jobs. For example, courses of product data management and product portfolio management are developed based on a research project outcome of product portfolio management. Interviewees mentioned that a lot of master's degree graduates had successfully got the job in the case company of their master thesis by doing research on product portfolio management areas with the case company. Amit et al., (2012) presented that business model innovation can either occur by adding new activities or by linking activities in a new way. Mitchell et al., (2004) researched the Art Institute of Pittsburg and proposed that building curriculum to concentrate on what students need for job success and helping graduates get jobs are triggers of business model innovation. Therefore, we think that a single project in the IEM research unit whose outcomes bring the development of new courses into the degree program, will drive the reconfiguration of its existing business model, as shown in Figure 19.



Figure 19. The impact of a single project on business model innovation of degree program

6.2 Limitation

This research has multiple limitations. One of the limitations of this study is data collecting. Data were collected by face-to-face interview and online meetings. No group discussion was organized to clarify one specific question. In addition, the interviewer only spoke to one person in each case project because of some unexpected reasons, e.g. the project manager was on maternity leave, and had limited access to the detailed content of the case projects due to no disclosure agreement.

The number of case projects for qualitative analysis is limited to two for this research. In the future research, we can enlarge the cases for cross-comparison to support findings. This study explores the existing business logic of the IEM unit and shows potential impacts of the on-going case projects on renaming research areas or introducing new

courses. However, the selected projects are not strongly related to the business model innovation because the case organization usually made decisions on whether or not to reconfigure value proposition or introduce new activities based on the impact degree of the research project's outcome on customer needs, education, job needs. One direction for future research is to collect project's data for the past 10 to 15 years to find the other possible drivers for innovation in the IEM unit's business model.

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APPENDIX 1-INTERVIEW THEMES AND QUESTIONS

In order to have a deep insight on the interrelation between business model innovation and project, we divided interview questions into four parts, consisting of existing business model, project selection, project, business model innovation. The questionnaire of this thesis is listed as below.

- **Existing business model**

1. Could you talk about your existing business model? How would you define and describe your business model?

- **Project selection**

1. Do you have a specific procedure used for selecting the on-going projects? What is the project selection procedure?

2. Do you involve your partners into evaluating your decision-making criteria? Who is the final decision maker?

3. Do you define your criteria for each new project? What criteria did you use to select this project?

- **Project**

1. Is this project new to IEW department? Is it representing an entirely different market? What are the peculiarities of this project involving?

2. For whom is this project creating value? Is this project serving an entirely different customer segment?

3. What value this project delivers to your customer? Could you talk about your value proposition of this project in your business model? What is unique about it?

4. Which kind of problems will this project solve for your customer?
5. Who are the partners of this project? What kind of resources you can obtain from your partners?
6. How does this project develop capabilities for you?

- **Business model innovation**

1. Does your existing business model fit this project's operation? How does this new project alter the elements of business logic?
2. Would your firm consider innovating your business model? Why and how do you reconfigure the existing business model?
3. What aspects of your business model would consider for innovation? Why and how do you develop the new business model?